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Forest Insect Investigations

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"TO CONTROL OR NOT TO CONTROL" AGAIN TO THE FRONT.

By
F.P. Keen

In the February, 1924, issue of the News Letter, Dr. Burke raised a storm of criticism with his article "Should Insect Infestations In The National Parks Be Controlled?" Never before did we realize that our news sheet, intended for home consumption, was so widely read, and by such a critical populace.

Dr. Burke's plea was for the preservation of National Parks as wilderness areas. He said in part "According to the Congressional acts creating the National Parks, they are areas which Nature, not man, has made grand or beautiful and which man has set apart to be kept for all time as Nature has made and is making them. Obviously the less man interferes with the natural processes through which Nature works the more natural the Parks will be and the greater the opportunity for posterity to study Nature as she does and is."

And now comes Mr. Howard R. Flint in the American Forests and Forest Life of July, 1926, with an article entitled "Wasted Wilderness". Mr. Flint takes as his text an article (by Mr. Miller) in the "Do You Know" column of the Official Record of December 9, 1925, which states "that there are 30,000 acres of dead forests in the Yosemite National Park -- brought about by the activities of two insects, one a defoliator and the other a bark beetle." And Mr. Flint remarks "No doubt this item quoted above reminds every thoughtful biologist, botanist, and forester and a few born philosophers who may read it that the way of all things organic is back to dust. A tree, commonly regarded by many as a permanent part of the landscape, is not at all a permanent thing in the natural order of the universe. It lives, grows, reproduces, and dies like other living things. -- What does it matter whether they die of senescence, the ax, or the effects of the tireless mandibles of countless tiny insects? Disolution death, decay is Nature's common law".

What does it matter? And if so when and where? We should ponder that question thoughtfully. Surely we are not going to attempt the quixotic task of stopping all death. But if not that, what tree death will we attempt to halt? Let us try to adjust our standard of values.

Certain Park areas are chiefly valuable as wilderness areas. As Dr. Burke has suggested and Mr. Flint pleaded, "Surely we need some modest areas set aside to show posterity how a virgin forest appears, how it develops, how it dies". Some areas within the National Parks are admirably suited for such wilderness areas. Let's not disturb the birds, the flowers or the trees.

Other forest areas within the Parks are chiefly valuable for the massed forest effect, as seen from highways or scenic points. The individual tree is of no importance. It is the wide vista that has the appeal. The sensible thing to do on such areas is to control only such forest insects as destroy the mass effect, such insects for instance as the Black Hills beetle on the Grand Canyon Park's north rim, and the Mountain Pine beetle in the Crater and Yosemite.

On recreational areas intensively used, both in the National Parks and on the National Forests such as home sites, hotel sites, and camping places, the individual tree becomes important. Certainly we should do all we can to protect these trees from an untimely death, even if we cannot prevent the ultimate end.

On National Forests in general economic values take precedence over aesthetic values. All endemic insect losses which are offset by the natural increment should cause no concern. We have found no way to stop them anyway, so why not let nature take her course? On the other hand, epidemics which kill a volume of timber in excess of the increment often deserve attention. In such cases, the problem resolves itself into a question of economics, whether or not the timber which can be saved will justify the cost of control. With our present expensive methods of control the timber must be quite valuable before such work is warranted.

Let us not be so eager to apply control methods to every situation where insects are killing trees. Let's first decide what values are at stake and what benefits may be secured from the contemplated work. Perhaps the forester or timber owner in his reluctance to rush into control work has a better perspective of the true values than we. Sometimes the other man is right.

BREVICOMIS MORTALITY IN CENTRAL OREGON.

In December, 1924, after an unusually warm spell of several weeks duration, the following maximum and minimum Fahrenheit temperatures occurred at a weather Bureau station not far from a 200,000 acre yellow pine stand in Central Oregon in which an epidemic infestation had been in progress for several years:

| Date (1924) | Maximum | Minimum |
|-------------|---------|---------|
| December 17 | 9 | -12 |
| 18 | 7 | -16 |
| 19 | 6 | -16 |
| 20 | 4 | -15 |
| 21 | 10 | -3 |
| 22 | 11 | -20 |
| 23 | 4 | -38 |
| 24 | 4 | -40 |
| 25 | 12 | -34 |
| 26 | 17 | -29 |

This ten day period of low maximum and exceedingly low minimum temperatures was unequalled for its duration and severity in the history of weather Bureau records in central Oregon.

That the 1924 overwintering generation of brevicomis suffered a heavy mortality is clearly shown by the results of two beetle cruises of eight sections. These cruised sections were scattered in various portions of the 200,000 acres involved in the epidemic infestation and were chosen as being typical of the various conditions prevalent on the area. The total volumes killed by the various generations of brevicomis as revealed by the hundred per cent cruises are as follows:

1924 summer generation - 320 M board feet
1924 winter generation - 455 M board feet
1925 summer generation - 116 M board feet

In other words, the summer generation of 1925 killed hardly one-fourth as much timber as the 1924 winter generation and this in the face of what had apparently been an increasing infestation.

106 trees which had been killed by the 1924 winter generation were felled in various parts of the area in June, 1925. From these trees 321 bark samples were carefully analyzed. It was found that 80.2 per cent of the larvae were dead in the outer bark and that only 19.8 per cent had emerged as beetles or were still alive in the outer bark.

No consistent relationships were found to exist between bark thickness and mortality, height above ground and mortality and diameter of trees and mortality. However, a striking relationship between elevation

and mortality of larvae was found to occur. The explanation for this, according to Meteorologist Edward L. Wells of the U.S. Weather Bureau, is that the colder air layers settled into the lower portions of the timbered basin.

This relationship between elevation and mortality of larvae is indicated by the following table:

| Range of elevation | Mortality per cent |
|--------------------|--------------------|
| 2800 - 3000 | 87 |
| 3001 - 3200 | 85 |
| 3201 - 3400 | 81 |
| 3401 - 3600 | 63 |
| 3601 - 3800 | 44 |
| 3801 - 4000 | 47 |

A.J. Jaenicke

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FOREST INSECT CONDITIONS IN THE YELLOWSTONE NATIONAL PARK.

Insect conditions in the Yellowstone show some improvement over those of last year. The spruce budworm (*Cacoecia fumiferana*) which several years ago killed numerous Douglas Fir in the northern section of the Park along the Yellowstone River appears to have disappeared. So also has the sawfly (*Neodiprion* sp.) which, together with the needletyer (*Eulia* sp.) was involved in the destruction of large areas of lodgepole pine in the western part of the Park near West Yellowstone, Mont.

The needletyer laid a larger brood of eggs this year than last. Many of these hatched and the caterpillars are mining in the needles and building their tubes. There is a question, however, whether the needletyer will be able to kill trees now that its co-depredator, the sawfly, is disappearing.

The Douglas Fir beetle (*Dendroctonus pseudotsugae*) continues to kill scattered groups of Douglas fir in the vicinity of the areas defoliated in past years by the spruce budworm. The Oregon pine beetle (*Ips oregoni*) is killing some lodgepole in the vicinity of West Yellowstone. The danger of this species "breeding up" in the large areas of needletyer-sawfly defoliated trees and attacking nearby healthy stands is about over.

Spraying of the lodgepole pine along the highway between West Yellowstone and the Madison River bridge to control the needletyer infestation, started June 25th and was completed July 10th. A strip of trees from 150 to 200 feet wide on each side of about ten miles of main and lateral highway was sprayed. 3800 pounds of arsenate of lead (powdered), 140 gallons of fish oil and 60,800 gallons of water was used. The work was done with a Fitzhenry-Guptil motor truck sprayer, an 800 gallon motor truck water carrier and a crew of ten men.

H.E. Burke.

MONTEREY PINE SUFFERS FROM VALENS ATTACKS.

A number of reports have been received from the vicinity of the Bay Region which indicate that the Red Turpentine beetle has again become very aggressive in killing Monterey Pines. Hon. Wm. Kent reports the complete destruction of many trees on his estate at Kentfield, Marin County. The Plantations in the Berkeley hills injured or destroyed by the Berkeley fire have also been an attractive breeding ground for these beetles, which upon emerging have killed other trees in the vicinity.

F.P.Keen

SOLAR HEAT AND BARK-BEETLE MORTALITY IN OREGON

The following self-explanatory sentences are taken from a report dated August, 1913, by J.F. Pernot on the result of D. monticolae control operations in lodgepole and yellow pine on the Ochoco National Forest in Oregon:-

"A few logs (lodgepole) cut at the same time and left lying in the sun contained living larvae and pupae on June 20 (1913) beneath the bark on the under and shaded sides. On the upper side of small logs with thin bark, the broods were killed by solar heat. As a general rule, the very young larvae are able to endure much less exposure to the sun in the fallen tree than those that have completed their mines and are in the pupal stage."

This mention of the effect of solar heat on barkbeetle mortality is probably one of the earliest on record for western United States. Pernot had served two years in the capacity of forest examiner in charge of forest insect control work for the Forest Service in Oregon and Washington when he was killed on the Ochoco National Forest in eastern Oregon in June, 1914.

A.J.Jaenicke.

NAIL HOLES ATTRACT WESTERN PINE BEETLE.

Forty holes were made with a shingle nail in the outer bark of a 20" western yellow pine tree at Northfork, Calif. A female western pine beetle was placed in each hole. The result was a general attack of the western pine beetle over the entire trunk of the tree.

During periods of heavy flights of the beetle most of the trees treated in this manner probably would be attacked and killed. The method might be used advantageously to cause attacks on trees for experimental purposes or on trees used for traps in control work.

H.L.Person

"SHANGHIED"

Gentle taps are heard on the walls hiding the secret chamber. A few sounds of splintering wood and daylight leaks thru into the darkened cell. The prisoner is about to escape.

Quietly waiting by the gradually widening aperture, a kidnapper stands waiting for the appearance of his unsuspecting victim.

The exit hole is finished. The prisoner sticks his head out into the daylight. Quick as a flash the big red ant pounces upon the western pine beetle drags him forth from the pupal cavity and carries him off to feed his colony.

During May and June at Klamath Falls, this little drama was repeated many times. Trees from which Dendroctonus brevicomis were emerging swarmed with the large red wood ants (Formica haemorrhoidalis). They searched the bark and wherever they heard a beetle breaking out, they waited until it appeared and then carried it off. Scarcely a beetle escaped them.

This was also noted in 1916, in the experiments at Ashland, where the ants were particularly troublesome in carrying off the beetles from the rearing cages.

Perhaps we haven't given the ants enough credit for their work as predators. Since noting them at Klamath Falls, I would give them at least third place as natural destroyers of Dendroctonus brevicomis.

F.P.Keen

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THE ADULTS OF FLATHEAD BORERS AS FOREST TREE DEFOLIATORS

Usually we do not think of the beetles of flatheaded borers as forest tree defoliators. The adults of many species do, however, feed on the foliage of pine and other trees. Half a dozen Melanophila gentilis or M. californica placed in a jar with the twig of a Monterey pine or a western yellow pine for a few days will make numbers of the needles look like saws. Taking a position astride of a needle a beetle will feed down and almost through the needle and then back again to the near surface. One gouge finished and the beetle moves backward along the needle and repeats the performance a number of times. Very seldom is the work conspicuous in the forest but the flathead beetle is one of the many pests that takes its annual toll from the needle surface of the tree. Possibly it is only Nature's way of preventing too much growth.

H.E. Burke.

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WIRE SCREEN PREVENTS BARKBEETLE ATTACK.

Experiments to develop methods of preventing attacks of the mountain pine beetle (*Dendroctonus monticolae*) on lodgepole pine trees of special value are being carried on this season at the Eastern Entrance of the Crater National Park. Trees have been inoculated with various substances, sprayed with repellents recommended by the leading insecticide companies, and screened for the first 20 feet with 16 mesh wire screen. It is yet too early to draw any final conclusions but some of the sprays appear promising and the screen undoubtedly has prevented several attacks.

J.E.Patterson.

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LITTLE KNOWN FLATHEAD REARED IN CONSIDERABLE NUMBERS.

Several years ago the wood boring flathead (*Buprestis fremontiae*) was described from two beetles reared from the wood of the "slippery elm" (*Fremontia californica*) collected at Northfork, Calif. Since that time several attempts to obtain further specimens have met with failure. In May of this year, however, Senior Scientific Aid Al Wagner of the Northfork Field Station collected a quantity of infested wood and shipped it to the Palo Alto laboratory where it was caged. On July 6th the beetles started to emerge from the wood and they still are emerging. Apparently there is no such a thing as a "rare" insect providing the seasonal history, the habits and the habitat are determined.

H.E. Burke.

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ARE SOME TREES IMMUNE FROM INSECT ATTACK?

During the past two years a number of experiments in attracting the western pine beetle to yellow pine trees have been conducted at Northfork, Calif. In practically all cases the beetles can be induced to attack and kill a tree by caging the lower part of the trunk and placing beetle infested bark in the cage. When the beetles from the infested bark emerge they attack the caged part of the tree. This attack attracts beetles flying in the surrounding area to the uncaged part of the tree causing the entire trunk to be attacked and the tree to be killed.

This spring four trees varying in diameter from 24" to 34" and from slow to fast growth were tagged and killed in this manner. One yellow pine, however, has been treated in this manner for two successive years and still is alive and apparently doing well. It is 36" in diameter and shows a growth of about $\frac{1}{2}$ an inch in diameter per year. The beetles emerging inside of the cage attack the bark of the lower trunk but they do not succeed in overcoming the resistance of the tree. The flying beetles outside of the cage do not succeed any better in their attacks on the upper trunk.

H.L.Person.

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WESTERN PINE BEETLE INFESTATION DECREASES AT NORTHFORK.

The western pine beetle infestation in yellow pine at Northfork, Calif., which showed such a great increase last year shows a remarkable decrease this season. Great difficulty is being experienced in getting enough infested bark to carry on the experiments outlined. Predators may have more influence on the increase and the decrease in the numbers of the beetle than has been realized. As many as twelve clerids and eight trogloditids have been found this season in one square foot of bark.

H.L. Person.

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SPRING CONTROL WORK ON THE CRATER NATIONAL PARK

Spring control work on the crater started May 5th and was completed June 20th. The first work was conducted against the western pine beetle in western yellow pine near the South Entrance. Forty-three trees were treated between May 5th and May 12th. Work against the mountain pine beetle in lodgepole pine started at the East Entrance May 14th and continued through the Lost Creek, Sand Creek, Wheeler Creek, Kerr Notch, Munson Valley Anna Springs, Garden of the Gods and Crater Peak areas until June 20th, a total of 1701 lodgepole pine being treated.

Two methods of treatment were used. The yellow pine were felled and peeled and the bark was burned in pits. This method prevented the spreading of fires and resulted in the complete destruction of the beetles. The lodgepole were felled, limbed and topped and placed in the direct light of the sun from three to five days. They then were turned over so that the underside could be exposed in the same manner. This method of treatment is just as effective with lodgepole as burning and has the added value of favoring the escape of the parasites, of preventing the scorching of the adjacent trees which might cause further infestation, and of leaving the area treated without any unsightly piles of half burned logs.

J.E. Patterson.

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INDEX TO WESTERN FOREST INSECT NEWS BEING PREPARED.

Mrs. Sarah E. Bushey of the Palo Alto Laboratory is now preparing an index to the news letter. This will cover all past issues giving the titles of the articles contained, the control projects, and the insects mentioned. Mrs. Bushey hopes to have the index finished in time for the December number.

H.E. Burke.

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THE SEVERITY OF ENDEMIC AND EPIDEMIC WESTERN PINE BEETLE
INFESTATIONS IN YELLOW PINE IN OREGON.

A stand of 17 billion board feet of yellow pine (*Pinus ponderosa*) in Klamath and Lake Counties in southern Oregon has been covered by the writer by four annual beetle surveys. This stand contains almost one-fourth of the yellow pine of Oregon. It is bounded on the south and the west by the famous southern Oregon - northern California pine beetle control project.

Figures on endemic or normal beetle losses and epidemic losses as well are available for the five year period 1921-1925 inclusive.

In 80 per cent of the yellow pine, the losses have been endemic for all five years of the period. These endemic losses for each of the five years, in per cent of the total stand have been as follows:

| | | |
|------|---|---------------|
| 1921 | - | 0.23 per cent |
| 1922 | - | 0.23 per cent |
| 1923 | - | 0.26 per cent |
| 1924 | - | 0.31 per cent |
| 1925 | - | 0.28 per cent |

Average annual endemic loss - 0.26 per cent of the total stand.

In 20% of the yellow pine stand, the beetle losses have been epidemic for one to three years. The per cent of the total yellow pine stand killed in the epidemic areas by *brevicomis* is as follows:

| | |
|------|-----------------------------|
| 1921 | No important epidemic areas |
| 1922 | No important epidemic areas |
| 1923 | 1.25 per cent |
| 1924 | 1.17 per cent |
| 1925 | 1.00 per cent |

These endemic and epidemic losses are believed to be typical in their severity of *brevicomis* infestations in yellow pine elsewhere in Oregon.

A.J. Jaenicke.

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"BEE NO. 599"

The story of Melissa, a bee whose life was most intimately studied by a German Entomologist Prof. Karl von Frisch, is related in a most interesting manner in the June number of Atlantic Monthly under the above title. Read it. There is a great deal of food for thought in the methods and discoveries of this entomologist, even though some of it may be mere fiction.

F.P. Keen.

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AROUND THE WESTERN PROJECTS.

Dr. Craighead's western trip this season covered the more important projects with the exception of the work on the Kaibab. The first phase of his trip included a stop at the Southwestern Experiment Station at Flagstaff during the latter part of June and a field examination was made on the Lincoln National Forest.

In District 5, the period from July 3 to 10 was spent with the studies which are being conducted by Person on the Sierra National Forest at Northfork. One purpose of these experiments is to determine the relative susceptibility to western pine beetle attack of certain yellow pine trees showing different growth characteristics. Two dendrographs have been installed in these studies and a number of cages are being used to secure the beetle attacks. During our stay at Northfork, the experiments were visited by Dr. T. D. MacDougall from the Coastal Laboratory of the Carnegie Institute at Carmel, Cal., Dr. MacDougall who invented the dendrographs that are in use was much interested in the reaction of the trees to insect attacks as expressed by these instruments.

From Northfork, Craighead and Miller made the trip by auto to the Modoc where a very good impression was obtained of the infestation in the Happy Camp- Lava Beds area. Several days were then spent on the experiments which are being carried out by Patterson on the Crater National Park, and in checking over the results of the 1926 control work in lodgepole pine on this Park and at Diamond Lake on the Crater National Forest.

A trip was made thru the Klamath Indian Reservation with Chas. King, of the Weed Lumber Company whose cooperation made it possible to look over the insect control work that has been carried out on the large tract of patented timber within the reservation. We arrived at Bend, Ore., on July 18 and were met here by Evenden. Plans had been made to meet with Jaenicke at this point but the fire situation in District 6 interfered.

J.M.Miller.

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OREGON ENGRAVER BEETLE KILLING HEALTHY LODGEPOLE

Several groups of lodgepole pine have been attacked and killed this season by the Oregon pine beetle, Ips oregoni. along the western boundary of the Yellowstone National Park near West Yellowstone, Mont. Many of these trees appear to have been perfectly healthy when attacked by the bark beetles. The building of a boundary fence by nailing poles to standing trees appears to have been the attractive force which concentrated the beetles and caused the attack.

H.E. Burke.

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VISITORS AT WEST YELLOWSTONE

This season we have had more than the usual number of interesting and interested visitors.

June 13th Assistant Forester E.E. Carter incharge of Forest Management and Assistant District Forester Elers Koch and Assistant W.W. White of Forest Management in District 1 called and talked over forest insect problems.

June 29th District Forester Rutledge of District 4 and a party including the State Forester of Idaho and several prominent Idaho lumbermen stopped to look over the sawfly and needletyer infestation. The lumbermen had a very good word to say for our friend Jim from Coeur d'Alene.

July 13th, Assistant Secretary R. W. Dunlap of the Department spent an hour with us and asked a number of questions about the work and the results we are getting. Unfortunately, due to unusual weather conditions, we were unable to go into the field.

H.E. Burke.

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REPORTS

Funke, Fred - Report of San Bernardino Project, Insect Control, October 1, 1925, to June 1, 1926.

Miller, J.M. - Western Pine Beetle Studies and Experiments on the Cascadel Unit, Northfork, Cal., Season of 1924.

Miller, J.M. - Aerial Photography as a Method of Mapping Yellow Pine Areas to show losses Caused by Bark Beetles.

Jaenicke, A.J. - The Mountain Pine Beetle Situation at Diamond Lake, Umpqua National Forest.

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MANUSCRIPTS

Miller, J.M. - The Western Pine Beetle Control Problem. Submitted to the Journal of Forestry.

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ARITHMETIC BUGS

Recently an officer on reviewing a colored regiment perceived that one of his troopers was squirming considerably. Turning to him, he asked "Cooties"? "no, Major", the soldier answered, "Arithmetic bugs". "Explain yourself, nigger", the officer retorted. "Well, Major, they adds to my misery, they subtracts from my joy, they divides my attention, and they multiplies like hell".

Overheard

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RIGGS PASSES ON.

Former Entomological Ranger J. D. Riggs died at Trona, Cal., June 8, 1926. Riggs was connected with the Forest Insect Field Stations at Baker, Oreg.; Yreka, Calif.; Placerville, Calif.; and Ashland, Oreg.; from July, 1911, to August, 1916. Starting as a cruiser on the old Northeastern Oregon Project, Riggs worked on the Craggy Mountain, Barkhouse and Moffit Creek projects in northern California. He also had field charge for several years of the Antelope Creek project in the region northeast of Mount Shasta. This project, conducted by the McCloud River Lumber Company and their successors the Weed Lumber Company, was probably the first large insect control project initiated by a private lumber company. Riggs' success in this project convinced the owners that insect control is worth while and they have continued to carry it on for the past ten years.

Riggs was an ideal leader of a control crew. There was nothing needing doing to which he would not turn his hand, from the cooking of the breakfast in the morning to the washing dishes at night. He could, and would, "fire" a man who was not holding up his end of the work and still retain that man's respect and friendship. That he did his work conscientiously is proven by the oft repeated remark of his successor on the Antelope Project, "Riggs certainly covered that Antelope country. You can't go anywhere that you won't find his mark on the insect killed trees".

It will be a long time before we who worked with Riggs will forget the enthusiasm he showed for control work, or his quaint philosophy of life.

H. E. Burke.
